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SUPERVISING PHD STUDENTS IN A RESOURCE CONSTRAINED SETTING: CHALLENGES AND PROSPECTS

Walter Omona
Makerere Univerity, Uganda

ABSTRACT

A doctoral degree education and successful completion of a Doctor of Philosophy (PhD) study in a resource constrained setting is influenced by many critical factors among whom is the quality of the supervision process. This is because a PhD supervisor is expected to fashion a student's development to address deficits in knowledge and skills, undertake intervention to ensure timely completion of study, provide research assistance work to minimise the risk of withdrawal, and deploy personal networks to facilitate knowledge exchange and sharing to advance the study goals. The purpose of this paper is to contribute to a reflection and understanding of supervision of PhD students education in a resource constrained setting by examining the current state of PhD study, identifying the challenges that affect PhD research and supervision, and examining the interventions/opportunities that can be exploited to minimize these challenges to advance and promote the goals of a PhD study, with particular references to Uganda. It is hoped that the article will contribute to understanding PhD supervision challenges in a resource constrained setting so that the context unearthed in the paper can assist in putting into practice necessary actions and interventions to improve the quality of PhD supervision.

KEYWORDS

Higher education, PhD study, Research supervision, Challenge, Prospects, Resource constrained setting, Uganda

1. INTRODUCTION

In the international higher education agenda, many concern have been raised on the extension and impact of research at postgraduate level where a Doctor of Philosophy (PhD) studies and more specifically PhD supervision are acquiring a big significance and value. The expected quality PhD education with improved research dimension in universities in a resource constrained setting presents a concern on how to improve the worth of the PhD students' research in the institutions of

higher learning. For the purpose of this paper, resource-constrained will be defined economically, as referring to a country listed by the World Bank as having low income. Universities the world over are recognized as institutions established for the advancement of knowledge, scholarship and innovation and PhD studies are considered conduits through which universities develop research capacity and generate the high-end skills required for a functional economy and to address complex issues such as the current global financial challenges, climate change, poverty alleviation, etc. (Mutula, 2009). A PhD research should contribute new knowledge to a particular field and also prepare the candidate to be an independent researcher and entails conducting extensive research and writing in one's chosen field of study in order to provide a unique contribution to that field of study in which the PhD study is being pursued.

Currently, universities in a resource constrained setting like in Uganda are confronting a drastically changing learning and teaching environment characterised by increased demand, complex career expectations from the market and students, and a sense of a delaying completion rate than ever before. According to Abidin et al. (2011), students undertaking graduate study at universities are under increasing pressure to complete their candidature within particular timeframes, and faculty are also under similar pressure to attract and retain quality candidates who will be able to complete on time and attract funding and research quantum as well as raise the level and status of the institution's research profile. At the same time, these universities are attempting to do more with less in all areas of teaching and research as funding becomes more competitive and tied to key performance indicators and accountability measures. There are also pressures on PhD students to complete within proposed timeframe, publish / present conference papers, support families and also maintain jobs, and develop a broader range of skills that will enhance their marketability.

The purpose of this paper is to contribute firstly, to a review of the current state of doctoral education and PhD research supervision in a resource-constrained setting with a particular focus on Uganda; secondly, to give a reflection and systematisation about the challenges that affect PhD research and supervision in a resource constrained setting; and lastly, to examine the current interventions/opportunities that can be exploited to minimize these challenges. Only when it is possible to understand PhD supervision in a resource constrained setting and making a regular balance of challenges that contextualise this issue will it be possible to put into practice actions to improve on the quality of PhD supervision.

2. THE STATE OF HIGHER EDUCATION IN UGANDA

According to the National Council for Higher Education (NHCE) Uganda (2014), since 2006 when the NCHE first published "The State of Higher Education and Training", the Ugandan higher education sub-sector has continued to expand in terms of students' enrolments and the number of institutions providing higher education. These increases have, however, occurred in the face of declining or stagnant unit cost funding for education facilities, infrastructure and academic staff. The problems of funding is a challenge that the state and other stakeholders must address before standards in higher education are severely compromised. On a happy note, there have been improvements in female access to higher education, computer access and use, as well as enrolment in science and technology (NCHE, 2014). However, these latter enrolments are largely in computer-related areas rather than in basic, mathematical or other technical sciences. The unfortunate decline in the production of middle level technicians from technical institutions has

continued. The closing of technical institutes to create universities has continued. Students, parents and policy makers tend to prefer university over technical education. As a result of the many factors, including the perception that the quality of Uganda's higher education is declining due to a number of reasons, particularly funding, the percentage of foreign students coming to Uganda has been declining since 2006 (NCHE, 2014). This is a worrying indicator that must be addressed.

Kasozi (2015) points out that Uganda has constantly rethought the type of education to deliver to its young population and as modes of production and management of societies change, productive and survival skills must follow suit. To succeed, societies must constantly rethink how they acquire and improve knowledge and devise ways to pass it on to the next generation since no society can develop beyond the quality of its educational system. The digital age is driven by knowledge, most of which is acquired in quality institutions of learning. Material resources are important but human resources are the key to development. Although Uganda has had a history of a number of investigative initiatives to better its education, no thorough overhaul of education to embark on changes needed to modernize our society have ever been taken by policy makers (Kasozi, 2015).

The Uganda higher education system is structured like an "inverted pyramid" with more students in universities than other tertiary institutions or colleges. According to the NCHE (2014), in 2011, there were 143005 and 5000 students in universities and other tertiary institutions respectively. In the same year, there were 151 higher education institutions of which 29 were universities, two university affiliated institutions and two degree awarding tertiary institutions. The rest were other tertiary institutions, many of which were small with inadequate facilities. Gender balance was improving. A total of 2099 programmes were offered in higher education institutions in 2011. About 53% were offered in universities and the rest in other tertiary institutions. Some 457 (or 21.8%) were at first-degree level and 234 (or 11.1%) at Masters level. So few PhD programmes were being run that the NCHE had not, by 2011, gazetted regulations governing their offerings or recorded those that were being given in a database (Mamdani, 2007).

According to Mamdani (2007), the higher education sector in Uganda does not have agreed upon regulations or rules to create the next generation of academics for this nation. In fact, very few of the universities except Makerere University, Mbarara University, Bishop Stuart University, Islamic University in Uganda, Uganda Christian University, and Uganda Martyrs University conducted any basic or postgraduate driven research (see also, Liang, 2004, Carrol 2005, Sicherman, 2005). Almost all universities were teaching institutions. The Uganda government gave some token research monies amounting to about 500 million Ugandan shillings (about US $ 140,000) in 2009-2011 but this lifeline was closed soon after it was opened. Although NCHE had required universities to set aside 10% of their budgets for research, few, if any university implemented this requirement (NCHE, 2014). Thus, although research and knowledge production distinguishes a university from a high school, most Ugandan universities are indeed glorified high schools teaching knowledge that is produced elsewhere: from the web, foreign textbooks and newspapers. In fact, about 80% of information delivered in Ugandan universities, is of foreign origin (Mamdani, 2007). The need to increase local research capacity and to create the next generation of academics now cannot therefore be overemphasized.

3. PHD EDUCATION IN RESOURCE CONSTRAINED SETTING

Research is fundamental to the university. The PhD degree is a key part of the university's research activity and research training and is the highest degree awarded by the University for research-work carried out under the immediate supervision. Post graduate degrees especially at PhD level define research universities and in the current situation of survival strategies of universities (Muriisa, 2010), the research university continue to be a research university more due to its formal obligation and public monopoly of awarding PhD degrees (Halvorsen 2010). For this to happen, universities need to focus more effort to ensuring that those who register for the degree are able to complete their study and graduate in time through effective supervision. But in the present situation, this is not the case. There are increasing numbers of students registering who do not complete on time (Mouton 2011 and Elgar 2003).

According to Scott (2015), the major aims of higher education in general and PhD study in particular is firstly, to socialize the young into the communities they are citizens of; secondly, to make the next generation original thinkers and workers who can contribute to what is known for both their personal and community good; and thirdly, to produce skilled and thinking individuals who must use known wisdom to create better knowledge to improve themselves and their societies. To achieve these, Scott (2015) highlights a number of functions that should be performed by higher educations. These include training and supplying the market with the skilled labor force needed to drive economies including teachers, doctors, civil servants, engineers, entrepreneurs, scientist, social planners, lawmakers and many other categories of personnel; enhancing the social upward mobility of individuals and groups and thereby contributes to social harmony; equipping society with the thinking capacity it needs to function and compete in the modern world; contributing to the growth of knowledge by providing researchers with facilities for creating, disseminating and storing knowledge in institutions of higher education and other knowledge centres; contributing to the democratic governance by equipping its graduates with intellectual skills to understand and analyze political issues before taking appropriate positions; supporting knowledge based economic growth through general training of the labor force and advanced training linked to a country's innovation system; and lastly, strengthening the lower levels of education by training the needed teaching personnel and triggering relevant curriculum changes at the lower levels (Scott, 2015).

In Africa where there is a general resource constrain, available information indicates that African share of world scientific output has been declining in the last decade. The PhD output at many universities in Sub-Saharan Africa has declined. A study done by Cloete et al. (2014) for the Center for Higher Education and Trust (CHET) reveal that the total doctoral enrolment at seven sub-Saharan African flagship universities (namely the University of Cape Town (UCT), Makerere University, the University of Ghana, the University of Botswana, the University of Mauritius, the University of Nairobi, and Eduardo Mondlane University) for the period 2000-2001 to 2013–2014 was 3,538 doctoral graduates, with a share of 57 percent for UCT and the remaining 43 percent for the other six flagship universities. A slow growth in doctoral enrolments was observed for the six flagship universities, which contrasted with the increase in master's degree enrolments for the same period. Cloete et al. (2014) finding also indicate that not many master's degree graduates move on to enrol for a PhD after completion of their studies and there is a lack of incentives at the levels of the higher education institutions and of private and government sectors, to motivate African students to pursue higher level studies. The study further found that one of the major factor

affecting the production of doctorates at the six flagship African universities was that academics holding a PhD degrees end up doing either consultancy and/or additional teaching, which are more rewarding than producing more doctorates. It was also interesting to note that although Mauritius is ranked first in the Sub-Saharan region in the Global Competitiveness Report, 2015–2016 published by the World Economic Forum, the University of Mauritius does not produce a large number of doctorates (Khodabocus, 2016).

There is a global increase in the number of universities both public and private requiring PhD qualification. In Uganda alone, there are currently well over 30 universities compared to only one university in the 1980s (NCHE, 2014) and the demand for quality training has increased since universities are required to employ PhD graduates. Unlike other sectors, universities are distinguished not only by their monopoly on awarding PhD degrees but by their distinct characteristic of employing PhD graduates. The strength and rating of universities largely depends on the PhD graduates they are able to produce and the number of professors they employ. Moreover scholarly output are a major determinant of the university performance. But completing the PhD program has become a concern of many countries and universities especially in resource constrained setting (SARUA, 2012). Many students who register on a PhD program are not able to graduate on time and or drop out of the program before the completion of the program. It is noted that it takes longer to complete a PhD and even the dropout rates from the program has increased over the last decades (SARUA, 2012).

4. PHD STUDENT SUPERVISION

According to Russell (1996), the examination of PhD student supervision has the potential to make an important contribution to the quality of graduate research. On the one hand, PhD research supervision is concerned with the mechanics of ensuring that the student makes good progress towards completion (Hockey, 1996). On the other hand, the supervision literature indicates that ethical, technical and methodological problems can be minimized or prevented if all the participants in the relationship strive to enter it with clear expectations for their respective roles and about the rules for their interactions (Goodyear et al., 1992). Therefore, both on a departmental and individual basis, the PhD supervisor must be diligent about explicitly working with students to establish mutual expectations, responsibilities and benefits for working together and with other interested parties (Phillips and Pugh, 2000).

Hockey (1996) discusses the patterns and process of supervision and especially the roles of graduate students in producing effective supervision. In view of Hockey's (1996) study, effective supervision of PhD students are acknowledged to be a crucial factor in the latter's successful completion of the PhD (Frischer and Larsson, 2000). How well they are supervised is likely to be linked to the way they choose to occupy their role. This kind of experience is very interesting and meaningful to appropriate persons like students, supervisors and universities in order that they may examine what they should do and how they should go about playing their roles optimally. Kiley and Austin (2000) studied the mobility of graduate students in Australia and one of the reasons they cited that led to making a choice of university was related to supervision.

Moses (1992) argues that at each stage of the PhD research progress, students are likely to need different forms of guidance. They need particular guidance on when to stop data collection and

analysis, when to start drafting the thesis and how to structure it (Moses, 1992). Thus, the supervisors are expected and assumed to be guides (Cryer, 2000) and critical friends (Hockey, 1996; Sheehan, 1994). On the other hand, they should also be able to adopt flexible supervision strategies depending on the individual requirements, which are influenced by the attributes of the particular student (Hockey, 1996; Hill et al., 1994; McQueeney, 1996). This is due to the fact that PhD students are not homogenous, but highly diverse in terms of academic ability, personality attributes, motivation and attitude. Hence, how supervisors respond to students will, in part, be conditioned by these different factors and applying the same rigid strategy for each student may not always work effectively (McQueeney, 1996). Burgess et al. (1994) also pick up the theme of changing research stages and the need for a supervisor to be flexible in an attempt to meet the needs of individual students. Supervisors who have this flexibility can be more helpful to their research students (Haksever and Manisali, 2000). Norhasni and West (2007) explained PhD student supervision as a blend of academic expertise and the skilful management of personal and professional relations, improved accessibility for students seeking advice from supervisors, and having in place standard guideline from Universities to select a potential supervisor.

5. CHALLENGES OF PHD SUPERVISION IN RESOURCE CONSTRAINED SETTING

A report authored by the AfricaNetherlands Research Programme on Alternatives in Development (SANPAD) in 2011 agree that higher education systems in sub-Saharan Africa are at a crossroads. On one hand, on a national level, the processes of democratisation and liberalisation of higher education institutions are placing universities in a more transparent and active context. On the other hand, on a global level, the impact of globalisation processes and the knowledge society are pushing for an urgent reform of university systems. These are imposing numerous challenges as far PhD research and supervision are concerned. Zakri (2006) outlines what he believes to be three main challenges affecting PhD research process in resource constrained setting namely; research capacity, research productivity and research utility. Research capacity refers to the availability of research facilities and the availability of trained human capital. Research utility focuses on the relevance of research outcomes as they relate to the national development agenda or priorities. Because national or international development is a cross disciplinary subject, research should try and involve researchers from different disciplines, otherwise the outcome would be of limited value. Research product refers to the optimisation of the available resources in order to enhance the quality of research. Zakri (2006) notes that universities in developing countries are not fully geared towards solving development-related problems. The study found gaps in linking research with development priorities. For example, there are weak links between knowledge producers and knowledge users and between knowledge production and innovation.

A report by Greenberg and Versluis (2017) made it clear that a major factor in Makerere's University, Uganda, success in its adoption of ICT was the skill and personalities of key players and the collaborative way in which they worked. The report emphasizes that without leadership, the success in the adoption of ICT in Makerere would not have come as easily or as quickly and points out that the calibre of leadership must continue if Makerere is to have similar success in the future. This adoption of ICT together with increased globalization process has provided Makerere University with opportunities to develop in global markets through increased enrolments of

international students and introduction of various models of e-supervision. The new models do not require physical or face to face contact. Instead, students get in touch with their supervisors through tablets, laptops, phones, Web, HTML, Videos, WIKISPACE, among others. These innovations have ensured that scholarly knowledge is readily available online in workstations, homes and anywhere, (Collins et. al, 2012). Even those students who need laboratories for data collection can adequately be supervised using the technology.

According to Kimani (2014), the major challenge especially for a developing country like Uganda is not only how fast the supervisors are able to embrace and utilise the available ICT but also how to ensure that the technology is available in all the universities to facilitate e-supervision. In an effort to scale up the utilisation of ICT for research supervision for postgraduate students, Kimani (2014) further points out that other challenges include how to change the mind-set of the supervisors, especially those that are used to the traditional ways of supervision of one-on-one/face to face, and the poor state and diversity in economic and ICT infrastructural realities in Uganda. As observed by Cloete et al. (2013), many African countries while trying to get integrated into global scientific economy are at the same time struggling to 'fix' their higher education systems. In the circumstances, the challenge is how to operationalize the e-supervision, and improve ICT to enhance the quality of postgraduate supervision and at the same time cope with the increased demand.

Developing academics through PhD supervision is not only about producing competent researchers. Universities in many resource constrained settings in Africa have large undergraduate (and postgraduate) teaching loads, and in some countries, like Uganda, undergraduate teaching remains an area needing significant attention, with poor throughput rates at undergraduate level. The complexities of developing competent university teachers is an area in which much research and development has taken place, yet teaching remains under-prioritised and under-valued in the academy. In preparing young people for the academy, research training alone is not adequate. As described in a recent HESA (Higher Education South Africa) document, in as much as it is recognised that it takes an extended period of induction, practice, mentoring and support to develop as a researcher, it is inadequately acknowledged that to become an effective teacher and PhD supervisors in an academic context similarly requires an extensive period of induction, practice, mentoring and support. In the same way as theory, methodology and methods are explicitly taught as part of the grounding of a researcher, it is also necessary to ground future and new academics in the purposes of higher education, the challenges of transformation, engaging with a diverse student body, the nature and assessment of student learning, and the induction of students into disciplines and knowledge production (HESA, 2011).

According to Wadee et al. (2011a), writing and completing a PhD degree requires resources and commitment both by the students and supervisors. It is also important that students interested in PhD training possess self-discipline in relation to work habits, endurance and persistence in the face of setbacks, self-evaluation of ones work, willingness to respond to advice and criticisms, willingness to work independently, desire to enquire and team spirit. Mentoring and supervision are essential to foster these qualities into students (Wadee et al. 2011a). Academic supervisors and mentors undertake to guide the candidate through the academic, administrative and developing the intellectual abilities of a student required for the completion of the PhD and writing is a central activity in the process of transition from novice to expertise (Samara, 2008). The PhD students

enter the program as novices who eventually become experts in their field. Becoming experts means appropriating the discipline's discourse and culture a process where writing is a key. The supervisors represent the disciplinary culture and their feedback reflects the disciplines' thinking and writing practice. Supervisors are supposed to walk students through the path of mastering the disciplinary culture, the thinking and intellectual growth within the discipline to enable the students to grow into independent thinkers. Thus, the main role of supervisors is to facilitate the students' development of a research identity through mastering the oral and written discourse of the discipline (Dysthe, 2002)

The failure of many students to complete the PhD program can also be attributed to the failure of the student, institutional structures and lack of support training in basic skills to enable the student to complete the training (Muriisa, 2010). Most PhD programs in Uganda are by thesis, and there is no formal requirement that students undergo basic training programs to enrich their skills in research and critical thinking. Therefore, many students lack basic skills in academic writing and analysis as well as exposure and grounding into research methodologies and theoretical foundations that would allow them to advance on their PhD writing. A report by Freeman, et al. (2010) identifies structural problems for academic staff, including inadequate salaries, scarcity of university revenue for research, supervising graduate students without relief from teaching, service (including clinical), and other administrative duties, which all further burdened capacity development, output, and impacts of PhD research and supervision.

Until recently, productive individual supervision was considered the main factor for the completion of a PhD and there was constant question of what the responsibilities of the students and the supervisors were how often they should meet (Grant, 2005) and the delays in PhD completion were attributed to failure in the supervision system. At one gathering, after spending about 10 years on a PhD and finally defending his dissertation one Ugandan cried out that in Uganda education system there are "academic terrorists" who terrorise students and they fail to finish their degrees (Muriisa, 2015). By implication this was an allusion to challenges of supervision where the role of supervision in completing the PhD is recognised. Indeed, Wadee et al. (2011) notes that while the number of students enrolling for the PhD program in South Africa has increased recently, a large number do not complete their studies because of the poor relationship between supervisors and their students and the overall quality of supervision, among other factors. According to Ali and Kohun (2006), the background of students and the lack of effort put in by students during the program also have a lot to do with the delay of completion of the PhD program.

Finally, Baptista (2011) points out many other challenges that are emerging in a dynamic spiral of change and influencing the ways PhD supervision and its quality, purposes and value are being understood especially in resource constrain settings. These challenges include the emergence of new and other types of PhD students and programmes; the development and understanding of research careers; the increasing need to discuss financing procedures; the necessity to promote more mobility actions at this level; the definition of learning outcomes, even though flexibility and diversity have to be assured; the development of generic skills and inter as well as transdisciplinary studies within the doctorate; the growing concern about originality of the thesis or the research which is developed at this level; the definition and continuous questioning and 'revision' of PhD supervisors' competences and responsibilities; and the necessity to develop training programmes which can suitably respond to both PhD supervisors and students' needs.

6. PROSPECTS FOR IMPROVING PHD SUPERVISION IN RESOURCE CONSTRAINED SETTING

Despite the challenges facing PhD research and supervision especially in a resource constrained setting like is the case with Uganda, there are still considerable glimmers of hope that all is not lost. According to a report from the Office of the President (2017), Republic of Uganda, the government of Uganda, has for example, began to recognize the importance of research and are increasing support for research to universities through providing seed funding in universities and research institutes as well as through the Uganda National Council of Science and Technology. Examples of this fund include the Presidential Initiative on Banana Industrial Development to establish state-of-the-art banana processing enterprises in Uganda producing value-added banana products with competitive market strength both locally and globally, manned by rural farmers/entrepreneurs; and the Science and Technology Innovation Fund which was started purposely to enhance the development of science and research in the country. The initiative seeks to advance scientific research through better funding and research promotion through various bodies including the Uganda Industrial Research Institute (UIRI), the Uganda National Council of Science and Technology (UNCST), Makerere University, and the various scientific research stations across the country (Office of the President, 2017).

With respect to access to information for research, postgraduate students in public universities in Uganda are now able to freely access thousands of scientific and professional journals and e-documents from services such as the International Networks for Availability of Scientific Publications (INASP) and other initiatives aim at providing free access to online journals such as the Health Internetwork Access to Research Initiative (HINARI) through the World Health Organization (WHO), Agriculture Global Organization for Research Access (AGORA) through the Food and Agriculture Organization (FAO) and African Journals Online (INASP, 2017). This shows considerable progress in comparison to the situation prevailing before. Makerere University Library is also transforming/translating their print research collections into digital format through Makerere University Institutional Repository (MakIR) as a strategy to make them more accessible and to enhance resource sharing. Scholars and publishers are now required to make their publications available through MakIR so that they can be easily and widely accessed. These tools are needed to ensure that scholars involved in research especially PhD students know what their counterparts are doing elsewhere, thus enhancing collaboration, the sharing of knowledge and best practices.

The Association of African Universities (AAU) together with its partners, while playing a catalytic role in the revitalization process of higher education in general and PhD study in particular, has for examples, designed a series of interventions meant to ameliorate the difficult situation higher education institutions in Africa face in advancing PhD research and supervision (AAU, 2016). These interventions have been in the key areas of institutional leadership and management; promoting academic mobility, including the African diaspora; ICT development for teaching, learning and research; making African thesis and other scholarly works available to the wider audience in and outside Africa; availing graduate fellowships and small grants for PhD support; linking universities to the productive sectors of the economy; and giving support to African higher education institutions to assist their host countries achieve the sustainable development goals

through policy research. Other initiatives such as the Africa Centers of Excellence; Partnership for Skills in Applied Sciences, Engineering & Technology; the Pan African University; Harmonization of African Higher Education Quality Assurance and Accreditation are all part of various efforts to improve African higher education (Kiamba, 2016).

Challenges to increasing PhD outputs in resource constrained settings are linked to the challenges that the higher education sector faces as a whole, not least of which are access to sufficient resources to invest in the human resources and the infrastructure required to meet demand. However, SARUA (2012) points out that clear opportunities exist for regional and institutional collaboration to build the capacity of institutions to grow PhD outputs and improve the quality of PhD supervision and education, and in turn enhancing research capacity. These opportunities include escalating the numbers of PhD graduates through external intervention programmes which draw on the vast institutionalised training expertise through global collaborations, and expanding significantly the levels of funding for PhD studies with a focus on full-time study. This requires, according to SARUA (2012), new and substantial refinancing models if the goal of increased numbers of PhD students is to be achieved; strengthening and elaborating the relationship between universities and industry and science councils so that larger numbers of PhD students are trained and supported through learning in practice while at the same time remaining in touch with on-campus academic expertise; working as inter-university teams in a collaborative environment to help to stimulate research; creating an enabling environment for building communities of scholars; rethinking the current approach to PhD supervision and determining improved and innovative ways in which to support PhD candidates; and developing benchmarks for PhD supervision and research and, in doing so, assist Masters and PhD students to meet these benchmarks and improve research outputs.

According to Freeman et al. (2010) review report on enhancing research capacity in Uganda, Makerere University which is the main public university in Uganda has advanced in research capacity and transformed the research environment on campus since 2000 using external funding to which SIDA contributed generously. The achievements are remarkable given major deficits in central administrative functions to support research and research education. Makerere University scholarships funded by SIDA covered tuition, fees, and research costs for approximately one quarter of those 600 students registered in PhD programs at Makerere University, contributing significantly to a critical mass of researchers who have influenced the environment and culture of PhD research and supervision campus wide compared to ten years ago. In the report (Freeman et al., 2010), the most impressive changes since 2000 in research infrastructure have propelled Makerere University into the global research community. Information and computing technology built from the ground up, and entry of the library into the electronic age link every element of the campus to global collaborators, resources, and audiences. New laboratories and equipment and a new demographic surveillance site enable researchers to work effectively in Uganda while attracting collaborators from other parts of the world.

The Freeman et al. (2010) review report further points out that the emergence of research themes and teams producing work highly relevant to reducing poverty and hastening development, increasing openness among researchers and commitment to continuing research as a regular feature of university life, more collaboration on manuscripts and grant-seeking, active participation in international networks, journal sponsorship and editorial responsibility, recognition in the form of

growing numbers of ISI-listed publications, Millenium Science Initiative Awards, and other research prizes, and significant contributions to policy (local, national, and international) characterize the new research culture and environment in public universities in Uganda where Makerere University is playing the lead roles. Collaboration with Swedish University colleagues markedly enhanced supervision, publication in the science disciplines, and preparation of a new generation of research mentors for growing numbers of PhD and Master students, including increasing the proportion of women (overall, enrolment of female graduate students increased from 25% in 1990 to 46% in 2008 (Freeman et al., 2010). This alliance with Swedish researchers and other partner universities also encouraged Makerere University's adoption of doctoral committees, the option of published papers to meet the thesis requirement, public thesis defenses, and exclusion of supervisors from examination committees which have all contributed immensely in improving the climate of PhD research and supervision.

7. CONCLUSION

Upholding quality in PhD supervision cannot be underrated since it is a specialised form of teaching recognised and formalised in all universities, globally and not only in a resource constrained setting. The obvious challenge is to ensure that the students are effectively supervised so as to produce quality research work which adequately fills the previously identified knowledge gap, satisfies the industry and contribute to addressing challenges in the field of study. This is because on the one hand, PhD education is strategic in that, in general terms, it contributes to the creation of a critical mass of local researchers, aiding development of PhD education systems in the entire African continent and promoting the development of countries in the Region. On the other hand, without the possibility of PhD education, the task of the university as an educational and research institution is incomplete. Bearing in mind the constant changes and challenges regarding PhD study and supervision as well as other educational issues, it is essential that PhD education, research and supervision in a resource constrained settings like Uganda are regularly rethought, and that perspectives and findings from stakeholders are shared to stimulate an engaged debate on how to address emerging challenges.

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